

What is claimed is:

1. A magnetic head comprising a film comprised of diamond-like carbon (hereinafter, referred to as "diamond-like carbon film") between a substrate and an insulating layer.
2. The magnetic head according to claim 1, wherein said film has a Vickers hardness equal to or greater than 2000 kg/mm².
3. The magnetic head according to claim 1, wherein said film has a thickness equal to or greater than 100 nm.
4. The magnetic head according to claim 1, wherein said magnetic head is a magnetoresistive head.
5. The magnetic head according to claim 4, wherein
the diamond-like carbon film, the insulating layer, a lower shield layer, a lower gap layer, a magnetoresistive element, an upper gap layer, an upper shield layer, and a protective layer are provided in this order on one side surface of the substrate.
6. The magnetic head according to claim 5, wherein said substrate is comprised of a nonmagnetic material.
7. The magnetic head according to claim 6, wherein said nonmagnetic material is AlTiC (Al₂O₃ · TiC), α -Fe₂O₃ (α -hematite), NiO-TiO₂-MgO, TiO₂-CaO, or NiO-MnO.
8. The magnetic head according to claim 5, wherein said substrate is comprised of a magnetic material.
9. The magnetic head according to claim 8, wherein said magnetic material is Ni-Zn ferrite or Mn-Zn ferrite.
10. The magnetic head according to claim 5, wherein said magnetoresistive element is a magnetoresistive element comprising a lower layer in the form of a tantalum layer, a SAL bias layer in the form of a NiFeNb layer, an intermediate insulating layer in the form of a

tantalum layer, a magnetoresistive layer in the form of a NiFe layer, and an upper layer in the form of a tantalum layer in this order.

11. The magnetic head according to claim 5, wherein said substrate has a thickness ranging from 60 to 100 μ m.

12. The magnetic head according to claim 5, wherein said insulating layer has a thickness ranging from 15 to 30 μ m.

13. The magnetic head according to claim 5, wherein said lower shield layer has a thickness ranging from 2 to 4 μ m.

14. The magnetic head according to claim 5, wherein said upper shield layer has a thickness ranging from 2 to 4 μ m.

15. The magnetic head according to claim 5, wherein said lower gap layer has a thickness ranging from 60 to 140 nm.

16. The magnetic head according to claim 5, wherein said upper gap layer has a thickness ranging from 80 to 160 nm.

17. The magnetic head according to claim 5, wherein said protective layer has a thickness ranging from 2 to 6 μ m.

18. The magnetic head according to claim 4, wherein

the substrate is comprised of a nonmagnetic material, and the diamond-like carbon film, the insulating layer comprised of an insulating material, a lower shield layer comprised of a magnetic material, a lower gap layer comprised of a nonmagnetic material, a magnetoresistive element, an upper gap layer comprised of a nonmagnetic material, an upper shield layer comprised of a magnetic material, and a protective layer comprised of an insulating material are provided in this order on one side surface of the substrate.

19. The magnetic head according to claim 18, wherein said substrate is comprised of AlTiC ($\text{Al}_2\text{O}_3 \cdot \text{TiC}$), α - Fe_2O_3 (α -hematite), NiO- TiO_2 -MgO, TiO_2 -CaO, or NiO-MnO.

20. The magnetic head according to claim 18, wherein said insulating layer is comprised of alumina (Al_2O_3), silica (SiO_2), AlN, Al-N-X (where X denotes one or more of Si, B, Cr, Ti, Ta and Nb), SiN, SiC, DLC, BN, MgO, SiAlON, AlON, Si_3Na , SiCO, SiON, or SiCON.
21. The magnetic head according to claim 18, wherein said lower shield layer and said upper lower shield layer are respectively comprised of Fe-Si-Al alloy (Sendust), Ni-Fe alloy (Permalloy), or Ni-Zn alloy (hematite).
22. The magnetic head according to claim 18, wherein said lower gap layer and said upper gap layer are respectively comprised of alumina (Al_2O_3) or silica (SiO_2).
23. The magnetic head according to claim 18, wherein said magnetoresistive element is a magnetoresistive element comprising a lower layer in the form of a tantalum layer, a SAL bias layer in the form of a NiFeNb layer, an intermediate insulating layer in the form of a tantalum layer, a magnetoresistive layer in the form of a NiFe layer, and an upper layer in the form of a tantalum layer in this order.
24. The magnetic head according to claim 18, wherein said protective layer is comprised of alumina (Al_2O_3) or silica (SiO_2).
25. The magnetic head according to claim 18, wherein said substrate has a thickness ranging from 60 to 100 μm .
26. The magnetic head according to claim 18, wherein said insulating layer has a thickness ranging from 15 to 30 μm .
27. The magnetic head according to claim 18, wherein said lower shield layer has a thickness ranging from 2 to 4 μm .
28. The magnetic head according to claim 18, wherein said upper shield layer has a thickness ranging from 2 to 4 μm .
29. The magnetic head according to claim 18, wherein said lower gap layer has a thickness ranging from 60 to 140 nm.

30. The magnetic head according to claim 18, wherein said upper gap layer has a thickness ranging from 80 to 160 nm.

31. The magnetic head according to claim 18, wherein said protective layer has a thickness ranging from 2 to 6 μ m.